From:	Walt Sanders
To:	Johnson, Barnes
Cc:	Firestone, Michael
Subject:	crumb rubber
Date:	Tuesday, March 03, 2015 4:21:35 PM
Attachments:	Connecticut Turf Study.pdf STC New Turf Presentation - Overview of Research 01282015.pdf

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Dear Mr. Johnson,

I just wanted to follow up on the note to you from Michael Firestone regarding the San Francisco Chronicle's recent article that appears to mischaracterize EPA's ongoing commitment to a policy of promoting the use of recycled tires as infill in synthetic turf sports fields, which is instrumental in removing recycled tires from the waste stream.

We and the public deserve to know if that is true or false.

As you know, the synthetic turf industry has been working with EPA for several years to assist the agency in understanding the substantial benefits of synthetic turf sports fields as a viable commercial use of crumb rubber. To this end, I have attached a PowerPoint presentation describing the history of the industry's involvement in this process.

With regard to the safety of synthetic turf and crumb rubber, the industry has been particularly diligent to ensure that both turf and crumb rubber do not present a health hazard to the public. In the past twenty years, over 50 independent technical studies have been performed substantiating the safety of turf and crumb rubber. I have included a list of those studies at the end of this email. Very recently, the Connecticut Department of Public Health (CT-DPH) sent the attached guidance letter to its sister agencies stating that allegations made through the media that there is a connection between crumb rubber and cancer has no basis in fact or science. The CT-DPH states, by its own admission the crisis of confidence manufactured by the media is not science-based. The CT-DPH's measured and rational position as stated in its letter is based on the significant body of independent research that has been conducted to answer questions of the safety of crumb rubber infill in synthetic turf, including a comprehensive study by CT-DPH and 3 other Connecticut agencies published in 2010. A full copy of the peer-reviewed study, which validated the human health and environmental safety of crumb rubber infill in both indoor and outdoor synthetic turf playfields, is available on the Synthetic Turf Council's website, www.syntheticturfcouncil.org.

CT-DPH concludes its letter with the following:

> "In summary, federal and state authorities have taken seriously the concerns that artificial turf fields may present a health risk due to contaminants in recycled rubber. The best way to investigate these concerns is via an exposure investigation. Studies conducted in Connecticut and elsewhere have shown a very low exposure potential, less than from typical outdoor sources of air pollution. The current news reports of a list of soccer players with cancer does not constitute a correlation or causality and thus raises a concern that currently lacks scientific support. Thus, the CT DPH position expressed in 2011 at the conclusion of the Connecticut study, that outdoor artificial turf fields do not represent an elevated health risk, remains unchanged."

Thank you very much for your consideration of our request.

Walt A. Sanders

Outside counsel to the Synthetic Turf Council

Vice President Law & Government Affairs
Van Fleet Associates, Inc.
1800 Diagonal Road, Suite 600
Alexandria, VA 22314
(703)647-7504 (O)
[redacted]
(703)647-7531(fax)

List of studies of synthetic turf and crumb rubber

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   CDM Smith, March 13, 2014
2. Artificial turf football fields: environmental and mutagenicity assessment

   Schilirò, T1,et al., Arch Environ Contam Toxicol, 2013
3. Bioaccessibility and Risk of Exposure to Metals and SVOCs in Artificial Turf Field Fill Materials and Fibers

   Environmental and Occupational Health Sciences Institute, Robert Wood Johnson Medical School, 170 Frelinghuysen Road, Piscataway, NJ, 2013
4. Review of the Human Health & Ecological Safety of Exposure to Recycled Tire Rubber found at Playgrounds and Synthetic Turf Fields

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5. Artificial turf football fields: environmental and mutagenicity assessment

   Department of Public Health and Microbiology, University of Torino, Italy, 201
6. Crumb Infill and Turf Characterization for Trace Elements and Organic Materials

   Dr. Paul J. Lioy and Dr. Clifford Weisel, Environmental and Occupational Health Sciences Institute, Robert Wood Johnson Medical School, October 31, 2011, Submitted to NJDEP
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10. Human Health Risk Assessment of Artificial Turf Fields Based upon Results from Five Fields in Connecticut

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12. 2009 Study of Crumb Rubber Derived from Recycled Tires Final Report

    Xiaolin Li, William Berger, Craig Musante, MaryJane Incorvia Mattina, Connecticut Agricultural Experiment Station, Department of Analytical Chemistry, May 2010
13. Hydroxypyrene in urine of football players after playing on artificial sports field with tire crumb infill

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    Lim, L. and R. Walker, New York State Department of Environmental Conservation and Department of Health, Editor, 2009
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29. Hazardous Chemicals in Synthetic Turf Materials and Their Bioaccessibility in Digestive Fluids

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California Integrated Waste Management Board, 2007, Integrated Waste Management Board: Sacramento, CA
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Dr. Christa Hametner, Vienna, Dr. Hans Theodor Grunder, Berlin, 2007
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Laboratory for Ecological Risk Assessment, 2007
37. Nitrosamines released from rubber crumb

van Bruggen, M., E.M. van Putten, and P.C.J.M. Janssen, 2007, RIVM: Bilthoven, the Netherlands
38. Preliminary Assessment of the Toxicity from Exposure to Crumb Rubber: its use in Playgrounds and Artificial Turf Playing Fields

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39. Re: Ambient Air Sampling for PAH's, Schreiber High School Football Field (101 Campus Dr., Port Washington, NY 11050; Sampling Date: October 17, 2007)

Broderick, J.C., E. Vonderhorst, Editor, J.C. Broderick & Associates, Inc.: Port Washington, NY., 2007

40. An Assessment of Environmental Toxicity and Potential Contamination from Artificial Turf using Shredded or Crumb Rubber

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41. Artificial turf pitches – An assessment of the health risks for football players

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43. Synthetic Turf from a Chemical Perspective - A status report

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Luhana, L., et al., 2004, Deliverable 8 of European Commission DG TrEn 5th Framework PARTICULATES Project

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Plesser, Thale S.W., Lund, J. Ole, Norwegian Building Research Institute, September 2004

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STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

Jewel Mullen, M.D., M.P.H., M.P.A.
Commissioner

Dannel P. Malloy
Governor
Nancy Wyman
Lt. Governor

EHS Circular Letter #2015-02
(Follow up to Circular Letter #2014-26a)

DATE: January 20, 2015

TO: Local Health Departments and Districts

FROM: Brian Toal, Gary Ginsberg
Environmental and Occupational Health Assessment

RE: Recent News Concerning Artificial Turf Fields

Brief Video Clip for Local Health Departments – *Click Here* →

This letter and video clip are being sent to update you regarding the news story that has circulated since last spring regarding potential cancer risks at artificial turf fields. Various media outlets have continued to run this story and a number of local health departments have inquired as to its validity. Since many Connecticut towns have installed or are considering artificial turf fields an elevated cancer risk would be an important consideration. However, this news story is still based upon very preliminary information and does not change CTDPH's position that outdoor artificial turf fields do not represent an elevated health risk.

The Connecticut Department of Public Health has evaluated the potential exposures and risks from athletic use of artificial turf fields. Our study of 5 fields in Connecticut in 2010-2011 was a comprehensive investigation of releases from the fields during active play. This study was conducted as a joint project with the CT DEEP and the University of CT Health Center and was peer-reviewed by the Connecticut Academy of Science and Engineering. Our study did not find a large amount of vapor or particle release from the fields confirming prior reports from Europe and the US. We put these exposures into a public health context by performing a risk assessment. Our risk assessment did not find elevated cancer risk. These results have been published as a set of 3 articles in a peer review journal and are available on the DPH artificial turf webpage (http://www.ct.gov/dph/cwp/view.asp?a=3140&q=464068).

The news story suggests soccer players and especially goalies may have an elevated cancer risk from playing on artificial turf fields. This is based upon anecdotal observations of a university soccer coach (http://www.komonews.com/news/local/Soccer-coach-Could-field-turf-be-causing-cancer-259895701.html). Reportedly the coach is developing a list of soccer players who have contracted cancer. However, the types of cancer are undocumented and so it is impossible to say whether they

Keeping Connecticut Healthy
DPH
Connecticut Department of Public Health

Phone: (860) 509-7740 • Fax: (860) 509-7785 • VP: (860) 899-1611
410 Capitol Avenue, P.O. Box 340308
Hartford, Connecticut 06134-0308
www.ct.gov/dph

represent a common effect and there has been no reporting on how long the goalies played on artificial turf fields to see if there was plausible exposure and latency. There are many reasons why someone collecting a list of cancer cases may appear to find a cluster including the fact that when you have a single-minded focus on finding cases you do not capture all the non-cases that would tend to disprove the cluster. Documentation of an increased rate in soccer players would require an epidemiological study in which the total number who play on turf fields in a given region was also known so that a cancer rate could be established and compared to those that do not play on artificial turf fields. The current news report does not constitute epidemiological evidence and thus is very preliminary.

Our risk assessment did cover carcinogens that are known to be in recycled tires and the crumb rubber used to cushion fields. Once again, we found there to be very little exposure of any substances, carcinogenic or not, in the vapors and dust that these fields generate under active use, summer conditions. Background levels of chemicals in urban and suburban air from heating sources and automobile traffic are much more significant sources of airborne carcinogens. The fact that we sampled 5 fields (4 outdoor and 1 indoor) of different ages and composition suggests that the results can be generalized to other fields, a conclusion supported by the fact that results were similar to what was found in California, USEPA and European studies. Our study did not evaluate ingestion of the crumb rubber itself as players are unlikely to ingest an entire rubber pellet. However, two studies, one in California and one at Rutgers University did evaluate the cancer risk if children ingested a mouthable chunk of playground rubber (10 gram), using laboratory extraction methods to estimate the amount of chemicals that might become available in the stomach and absorbed into the body. Both studies found very low cancer risk from this scenario (Cal OEHHA 2007; Pavilonis et al. 2014). Thus, CT DPH finds no scientific support for a finding of elevated cancer risk from inhalation or ingestion of chemicals derived from recycled tires used on artificial turf fields. US EPA has a similar position: "At this point, EPA does not believe that the field monitoring data collected provides evidence of an elevated health risk resulting from the use of recycled tire crumb in playgrounds or in synthetic turf athletic fields." (http://www.epa.gov/epawaste/conserve/materials/tires/health.htm)

In summary, federal and state authorities have taken seriously the concerns that artificial turf fields may present a health risk due to contaminants in recycled rubber. The best way to investigate these concerns is via an exposure investigation. Studies conducted in Connecticut and elsewhere have shown a very low exposure potential, less than from typical outdoor sources of air pollution. The current news reports of a list of soccer players with cancer does not constitute a correlation or causality and thus raises a concern that currently lacks scientific support. Thus, the CT DPH position expressed in 2011 at the conclusion of the Connecticut study, that outdoor artificial turf fields do not represent an elevated health risk, remains unchanged. For further information please contact Brian Toal or Gary Ginsberg at 860-509-7740.

References

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C Suzanne Blancaflor, M.S., M.P.H., Chief
Environmental Health Section
Ellen Blaschinski, R.S., M.B.A., Chief
Regulatory Services Branch

Synthetic Turf COUNCIL

The Safety, Research and Facts about Synthetic Turf with Crumb Rubber Infill

An Overview of the Research

Synthetic Turf COUNCIL

Introduction

The Synthetic Turf Council (STC) and its members are dedicated to providing safe and durable synthetic turf to millions of users across the country.

Since 2007, an estimated 4.5 billion square feet of synthetic turf has been installed around the world.

Crumb rubber infill is used in over 98% of sports fields
Crumb rubber provides shock absorption, traction, foot stability and diverts millions of tires from landfills in North America.

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Overview

STC and the synthetic turf industry take the health, safety, and welfare of synthetic turf users very seriously.

Over the past two decades, there have been more than 50 technical studies and reports since 1998 that review the health effects of crumb rubber as it pertains to toxicities from inhalation, ingestion and dermal contact, as well as cancer. All of these studies are posted on the STC website in their entirety at: http://www.syntheticturfcouncil.org.

This scientific research from independent academic, federal and state government organizations has unequivocally failed to find any link between synthetic turf and cancer, and all have concluded that synthetic turf with crumb rubber infill does not pose a human health risk to people of all ages.

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The Science

The STC believes that reliable scientific data should be the foundation of any discussion regarding the safety of synthetic turf with crumb rubber infill:

"The use of outdoor and indoor artificial turf fields is not associated with elevated health risks."

Connecticut Department of Public Health, *Human Health Risk Assessment of Artificial Turf Fields Based upon Results from Five Fields in Connecticut*, 2010

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"The best way to investigate these concerns is via an exposure investigation. Studies conducted in Connecticut and elsewhere have shown a very low exposure potential, less than from typical outdoor sources of air pollution. The current news reports of a list of soccer players with cancer does not constitute a correlation or causality and thus raises a concern that currently lacks scientific support. Thus, the CT DPH [Connecticut Department of Public Health] position expressed in 2011 at the conclusion of the Connecticut study, that outdoor artificial turf fields do not represent an elevated health risk, remains unchanged."

State of Connecticut, Department of Public Health, EHS Circular Letter #2015-02, January 20, 2015

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"Many governmental bodies including Norway, Sweden and California have recently reviewed the health issues associated with the use of crumb rubber as infill at playgrounds and synthetic turf fields. Their assessments did not find a public health threat."

Ly Lim, Ph.D., P.E., *A Study to Assess Potential Environmental Impacts from the Use of Crumb Rubber as Infill Material in Synthetic Turf Fields,* New York State Department of Environmental Conservation, June 2008

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In response to the media scare without any scientific basis, Lower Canada College (LCC), a leading K-12 private school in Montreal, tested the crumb rubber infill in their synthetic turf playfield against the most rigorous standard for toys in the world. The results were so low that the school and the parents of the young students agreed that its synthetic turf playfield is safe for continued use by children of all ages.

The test results are on the STC website, at http://www.syntheticturfcouncil.org.

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There have been more than 50 technical studies and reports issued between 1998 and 2014 that review the health effects of crumb rubber:

- 34 concerning inhalation toxicity
- 31 concerning ingestion toxicity
- 16 concerning dermal toxicity
- 5 concerning cancer

Three (3) Exposure Pathways:

1. Ingestion
2. Inhalation
3. Dermal Contact

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Ingestion, Inhalation, Dermal Contact

"Eleven different risk assessments applied various available concentrations of COPCs [chemical of potential concern] and none identified an increased risk for human health effects as a result of ingestion, dermal or inhalation exposure to crumb rubber."

A Review of the Potential Health and Safety Risks from Synthetic Turf Fields Containing Crumbs Rubber Infill, New York City Department of Health and Mental Hygiene, May 2008

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Ingestion, Inhalation, Dermal Contact

"Based on the available literature on exposure to rubber crumb swallowing, inhalation and skin contact…we conclude that there is not a significant health risk due to the presence of rubber infill for football players (for) an artificial turf pitch with rubber infill from used car tires."

Hofstra University, *Environmental and Health Risks of Rubber Infill: Rubber Crumb from Car Tires as Infill on Artificial Turf,* 2007

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Ingestion

"OEHHA then compared the levels of released chemicals to their health-based screening values, assuming a young child ingested ten grams of tire shreds; all exposures were at or below the screening values ***suggesting a low risk of noncancer acute health effects****."*

California Integrated Waste Management Board, 2007, Integrated Waste Management Board: Sacramento, CA

*"Based upon the current evidence****, a public health risk appears unlikely****. DPH does not believe there is a unique or significant exposure from chemicals that can be inhaled or ingested at these fields."*

Connecticut Department of Public Health, *Health Questions about Artificial Turf Fields*, Oct 2007

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Ingestion

"In the event of ingestion of crumb rubber particles, although it is highly improbable, the particles do not present any toxicity, as the digestive system is not powerful enough to extract the chemical components from the rubber."

Laboratoire de Recherches et de Controle du Caoutchouc et des Plastiques, *End of Life Tire Crumb Rubber in Sports Floors – Environmental Consequences,* Updated 2006

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Inhalation

"A screening-level assessment of health risks was performed by comparing the estimated exposures to health-based screening levels. ***All exposures were lower than the screening levels, indicating that adverse health effects were unlikely in athletes using these fields****."*

Office of Environmental Health and Hazard Assessment, *Safety Study of Artificial Turf Containing Crumb Rubber Infill Made from Recycled Tires: Measurements of Chemicals and Particulates in the Air, Bacteria in the Turf, and Skin Abrasions Caused by Contact with the Surface*, Department of Resources Recycling and Recovery, Editor. 2010, State of California

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Inhalation

***"Concentrations of VOCs and PM above field did not exceed background, even with high field temperatures**; Not likely to pose risk from inhalation."*

Lim, L. and R. Walker, *An Assessment of Chemical Leaching, Releases to Air and Temperature at Crumb-Rubber Infilled Synthetic Turf Fields*, New York State Department of Environmental Conservation and Department of Health, Editor, 2009

*"Based upon the current evidence**, a public health risk appears unlikely**. DPH does not believe there is a unique or significant exposure from chemicals that can be inhaled or ingested at these fields."*

Connecticut Department of Public Health, *Health Questions about Artificial Turf Fields*, October 2007

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Inhalation

"In summary, an analysis of the air in the breathing zones of children above synthetic turf fields do not show appreciable impacts from COPCs [Chemicals of Potential Concern] contained in the crumb rubber. Therefore, a risk assessment was not warranted from the inhalation route of exposure."

Air Quality Survey of Synthetic Turf Fields Containing Crumb Rubber Infill, New York City Department of Health and Mental Hygiene, March 2009

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Dermal Contact

"The chances that substances in the rubber cause skin irritation to non-sensitized persons is estimated to be low."

Hofstra, U., *Environmental and Health Risks of Rubber Infill: Rubber crumb from car tyres as infill on artificial turf,* 2007

"This study provides evidence that uptake of PAH of football players active on artificial grass fields with rubber crumb infill is minimal. ***If there is any exposure, then the uptake is very limited and within the range of uptake of PAH from environmental sources and/or diet."***

Joost G. M. van Rooij Æ Frans J. Jongeneelen, *Hydroxypyrene in urine of football players after playing on artificial sports field with tire crumb infill,* International Arch Occup Environ Health (2010) 83:105–110

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Dermal Contact

"As is apparent from Table 10, exposure to PCBs , PAHs, phthalates and alkyl phenols via the skin is extremely low and is measured in ng/kg body weight/day. It is therefore concluded ***that skin exposure to recycled rubber granulate will not cause any increased health risk."***

Norwegian Institute of Public Health and the Radium Hospital, *Artificial turf pitches – an assessment of the health risks for football players*, 2006, Norwegian Institute of Public Health and the Radium Hospital: Oslo. p. 1-34

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Dermal Contact

"It can be concluded that rubber tires contain PAHs originating from certain oils used in tire manufacturing, but there is clear scientific evidence that any release into the environment is negligible relative to other PAHs sources."

The European Commission, Scientific Committee on Toxicity, *Ecotoxicity, and the Environment (CSTEE),* December 2003

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Risk of Cancer

"It's hard to say if there is a link between crumb rubber and cancer like Hodgkin Lymphoma because the common age group of patients diagnosed with this cancer is either in their 20s or over 55 years old. We still don't know why some people get lymphoma and as of yet, there is no strong causative relation identified between environmental exposure and lymphomas.

There are so many chemicals in the environment. It's a hard thing to distinguish, whether the chemicals in artificial turf can cause cancer. A majority of the young adults who have played on the turf don't have the cancer."

Abhinav Deol, M.D., Hematology Oncology Team, Barbara Ann Karmanos Cancer Institute, Wayne, State University School of Medicine

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Risk of Cancer

*"Ingestion of a significant quantity of tire shred **did not elevate a child's risk of developing cancer,** relative to the overall cancer rate of the population."*

Rachel Simon, University of California, Berkeley, Review of the Impacts of Crumb Rubber in Artificial Turf Applications, February 2010

*"Genotoxicity testing of tire crumb samples … suggests that ingestion of small amounts of tire crumb by small children **will not result in an unacceptable hazard of contracting cancer."***

Detlef A. Birkholz, Kathy L. Belton, Tee L. Guidotti, *Toxicological Evaluation for the Hazard Assessment of Tire Crumb for Use in Public Playgrounds,* J. Air & Waste Management Association, 53:903–907, July 2003

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Risk of Cancer

"…regular exposure (e.g., regular play on ground rubber filled athletic fields) to ground rubber for the length of one's childhood does not increase the risk of cancer above levels considered by the State of California to be de minimus (i.e., a lifetime excess cancer risk of 1 in 1 million.)"

The U.S. EPA, *Child-Specific Exposure Factors Handbook, Interim Report,* 2002

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Risk of Cancer

"The available body of research does not substantiate the assumption that cancer resulting from exposure to SBR granulate infills in artificial turf could potentially occur."

An Open Letter concerning the potential cancer risk from certain granulate infills from artificial turf, FIFA, Prof. Dr. Jiri Dvorak, July 2006

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Conclusion

Scientific research from academic, federal and state government organizations has **unequivocally failed to find any link between synthetic turf and cancer**, or any other human health risk.

There can always be more research done, and the STC supports any future opportunities for independent, science-based research, but we are convinced by the over 50 studies since 1998 that confirm that anyone playing on synthetic turf with crumb rubber infill should rest assured it does not pose an elevated human health risk to people of all ages.

Synthetic Turf COUNCIL

Conclusion

"It's hard to say if there is a link between crumb rubber and cancer like Hodgkin Lymphoma because the common age group of patients diagnosed with this cancer is either in their 20s or over 55 years old. We still don't know why some people get lymphoma and as of yet, there is no strong causative relation identified between environmental exposure and lymphomas. There are so many chemicals in the environment. It's a hard thing to distinguish, whether the chemicals in artificial turf can cause cancer. A majority of the young adults who have played on the turf don't have the cancer….The health benefits of playing sports far outweigh keeping your kids indoors. The data is not there to support keeping kids from playing on artificial turf."

Abhinav Deol, M.D., Hematology Oncology Multidisciplinary Team at the Barbara Ann Karmanos Cancer Institute, Wayne State University, Detroit, MI, October 23, 2014

Synthetic Turf™ COUNCIL

Contact

Synthetic Turf Council

http://www.syntheticturfcouncil.org

office@syntheticturfcouncil.org

400 Galleria Parkway, Suite 1500

Atlanta, GA 30339

(678) 385-6720